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THE THRIFTY FOOD PLAN

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Agricultural Research Service  
U.S. Department of Agriculture  
Hyattsville, Maryland 20782

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## SUMMARY

A new food plan, the thrifty food plan, has been developed by the Agricultural Research Service (ARS). This plan has been proposed as a basis for setting the coupon allotment for the Food Stamp Program effective in January 1976 by the Food and Nutrition Service (FNS), the agency that administers the program. The thrifty plan will be used by ARS and FNS in the preparation of guidance materials for program participants and others who wish to economize on food. The thrifty food plan, which replaces the economy food plan, is the least costly of four food plans developed during the past year by ARS. 1/

The thrifty plan is made up of foods of different types (food groups) that families might buy, or obtain from other sources, to provide nutritious meals and snacks for family members. In the plan, amounts of food are suggested for men, women, and children of different ages (Table 1). A plan for any family can be determined by totaling amounts of foods suggested for persons of the sex and age of family members.

Families following the plan may choose from the food groups those economical foods they enjoy eating. When ARS estimates the cost for the plan (Table 2), the makeup of the food groups is based on the average amounts of foods used by survey households with relatively low food costs. A food list for a family of four for a month (Table 3) illustrates the kinds and amounts of foods used as a basis for estimating the cost for the plan.

Sample meals for a month, with recipes and lists of foods used in their preparation for a family of four, are being developed, and will be available upon request from the Consumer and Food Economics Institute. These sample meal plans show how foods in the thrifty plan can be combined into appetizing and nutritious meals.

The thrifty plan is an assortment of foods that represents as little change from average food consumption of families with relatively low food costs as required to provide a nutritious diet while controlling cost. The thrifty plan contains more meat, poultry, and fish and less dry beans, potatoes, and grain products than the economy plan, previously used as a basis for setting the coupon allotment (Table 4). However, both plans contain less meat, poultry, and fish and more dry beans and grain products than families consume on the average, as do most nutritious diets at low cost.

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1/ Revisions of the three more expensive plans, the low-cost moderate-cost, and liberal plans, were presented in Family Economics Review, Winter 1975, Consumer and Food Economics Institute, Agricultural Research Service, USDA.



Food consumption of households surveyed in 1965-66 that used food valued at or slightly above the cost of the economy plan was adopted as the basis for defining the kinds and amounts of foods in the plan. Food consumption patterns of these households are believed to represent a way of eating that would be palatable to households with limited food budgets.

Foods in the plan provide for a nutritionally adequate diet--one that meets the Recommended Dietary Allowances, set in 1974 by the National Academy of Sciences-National Research Council for all nutrients for which adequate reliable food composition data are available for determining the content of the plan. (See page 9.)

The thrifty food plan is at the same general level of cost as the economy plan, accepted by Congress for setting the coupon allotment for the Food Stamp Program. 2/ The U.S. average cost of food in the thrifty plan, August 1975, for sample households and for men, women, and children of different ages is shown in Table 2.

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2/ Amendments to the Food Stamp Act of 1964, House of Representatives Conference Report No. 91-1793. December 22, 1970.

## THE THRIFTY FOOD PLAN

Prepared by Betty Peterkin, Judy Chassy, and Richard Kerr

The thrifty food plan presented in this report was developed by the Agricultural Research Service (ARS) of the U.S. Department of Agriculture. It replaces the economy food plan, which was used as a basis for the coupon allotment from the time the Food Stamp Program was initiated until January 1976. The thrifty food plan has been proposed as a basis for the coupon allotment, effective January 1976.

Information about the thrifty plan is presented here in three parts: (1) the thrifty plan--why it was developed, what foods it contains, how it relates to average food consumption patterns and to the economy plan it replaces, (2) the development of the plan--the model and the data used, and (3) the estimated cost for the plan.

### I. The Thrifty Food Plan

#### What Is the Thrifty Plan?

The thrifty food plan is the least costly of four food plans developed by ARS in 1974-75. (See footnote 1/.) Like the more costly plans, this plan specifies the amounts of foods of different types (food groups) that families might use to provide nutritious diets for family members. The thrifty plan includes larger proportions of the foods that are economical sources of nutrients than the other plans.

The amounts of 15 food groups suggested in the thrifty plan for men, women, and children of different ages are shown in Table 1. These amounts can be totaled for persons of the sex and age of family members to determine the plan for any family. Food costs for the family following the plan can be estimated from costs for the plan released periodically by ARS (Table 2). In estimating these costs, ARS makes certain assumptions about the kinds and amounts of foods in the food groups based on the food consumption of households with relatively low food costs surveyed in 1965-66. A list of foods for a month typical of those used in estimating costs for the plan for a family of four is shown in Table 3.

#### Why Was the Thrifty Plan Developed?

The Department has prepared guides for selecting good diets at different levels of cost for over 40 years. Such guides, or food plans, have been revised from time to time to take into account new information about nutritional needs, nutritive values of foods, food consumption of families, and food prices.



Prior to 1974, the quantities of food groups in the food plans at four levels of cost--economy, low-cost, moderate-cost, and liberal--were last revised in 1964. 3/ Nutritional goals based on the Recommended Dietary Allowances (RDA) released in 1964 by the National Academy of Sciences-National Research Council (NAS-NRC) and food consumption data from a nationwide food consumption survey conducted by USDA in 1955 were used in the 1964 revision of the plans.

Certain assumptions with regard to price levels and selections of foods within food groups in estimating costs for the plans were revised slightly in 1967. Revisions took into account food prices and food consumption reported in the nationwide household food consumption survey conducted by USDA in 1965-66. Since the 1967 revision, costs for the economy plan have been estimated at 80 percent of the cost of the low-cost plan. Procedures comparable to those used in estimating costs for the other three plans could not be used for the economy plan. This was because low-income survey households in 1965, intended for use as a basis for food selections within food groups and food prices for the economy plan, were predominantly one- and two-person households with food selections and prices inappropriate for use in costing the plan.

The four food plans were evaluated after the RDA were revised in 1968 and were found to provide acceptable levels of nutrients for which adequate reliable food composition data were available. Therefore, no changes in the plans were made at that time.

The thrifty plan was developed and the three other plans revised in 1974-75 for several reasons:

1. In 1974 the NAS-NRC revised the RDA. 4/ Recommended amounts of some nutrients were changed, and allowances for additional nutrients were designated. The 1974 RDA were used to define the lower limit for nutrients and the lower and upper limits for food energy in the plans. (See page 16.) Allowances set in 1974 for protein and ascorbic acid for all sex-age

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3/ Family Economics Review, October 1964. Consumer and Food Economics Research Division, Agricultural Research Service, USDA.

4/ Recommended Dietary Allowances 1974, Eighth Edition, National Academy of Sciences-National Research Council, 1974.

categories are substantially lower than the 1964 allowances used in developing the earlier plans. Also, 1974 allowances for calcium, vitamin A value, riboflavin, and niacin for certain sex-age categories are lower than those set in 1964. On the other hand, thiamin allowances for all sex-age categories and iron allowances for some categories in 1974 are higher than those in 1964. Three nutrients for which allowances were not set in 1964--vitamin B<sub>6</sub>, vitamin B<sub>12</sub>, and magnesium--were considered in development of the new plans.

2. The nutritive values of some major types of foods have changed since 1964. For example, many ready-to-eat cereals are now fortified with one-fourth or more of the RDA for many nutrients; enriched bread and flour have more thiamin, riboflavin, and niacin added than in 1964. New information on the content of nutrients in foods has become available. For example, limited information on the vitamin B<sub>6</sub> and vitamin B<sub>12</sub> content of foods is now available and was used to estimate the amount of these nutrients in the plans.

3. Information on food eaten by men, women, and children of different ages on a nationwide basis became available. USDA's 1965-66 survey of household food consumption provided information for the first time on the food intake of individuals in the household. <sup>5/</sup> It also provided detailed information on the quantities and money value of food used (purchased, home-produced, or received as gift or pay) by the total household. <sup>6/</sup> Data from this study were used to estimate the amounts of groups of foods used to prepare meals and snacks for men, women, and children of different ages in households using food at various levels of cost. These amounts of food groups made up the food consumption patterns used in developing the new plans. (See page 14.)

4. Shifts occurred in food prices between 1964 and 1974. Prices for most foods increased, but some increased more sharply than others. Several foods that are generally used in large amounts in the less costly plans, such as dry beans and potatoes, were among those that increased sharply in price. They were not, therefore, as economical relative to other foods in 1974 as they were in 1964. To account for shifts in the relative economy of foods, prices paid by survey families in 1965-66, updated to 1974 levels, were used in revising the plans.

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<sup>5/</sup> Food and Nutrient Intake of Individuals in the United States, Spring 1965, Household Food Consumption Survey 1965-66, Report No. 11, USDA-ARS, January 1972.

<sup>6/</sup> Food Consumption of Households by Money Value of Food and Quality of Diet, Household Food Consumption Survey 1965-66, Report No. 17, USDA-ARS, October 1972.



5. Computerized techniques were designed for developing food plans, as they have been for solving many other nutrition and food service related problems. A quadratic programming model was used to find the combination of food groups (food plan) that represents as little change from the food consumption pattern as required to meet the nutritional goals at a given cost. It is assumed in this model that conformity to existing food consumption patterns is one measure of palatability of a diet. Additional information about the model and the data used is presented in part II, page 13.

6. The amounts of foods suggested in the 1964 food plans for some sex-age categories were similar even though amounts of certain nutrients recommended for those categories were slightly different. To simplify the plans, such categories are combined in the new plans. The 1964 plans were for 18 sex-age categories and for pregnant and nursing women; the 1974-75 plans are for 12 sex-age categories and for pregnant and nursing women.

7. Ready-made bakery products were included with flour, cereal, and bread as one of the food groups for which amounts of foods were specified in the 1964 plans. Bakery products, more prominent in the marketplace in 1974, generally are not as economical as flour and cereal as sources of most of the nutrients they provide. In the new plans, flour, cereal, bread, and other bakery products are included as four separate food groups.

#### Food Groups--Foods They Contain

Foods within a food group are similar to each other in nutritive value. In some groups--meat, poultry, and fish, for example--one food in the group might be used to replace another in a meal. Although each group is of special importance for one or more nutrients or as a source of food energy, several groups may provide appreciable amounts of the same nutrient. The cost of providing the nutrient may differ considerably among groups. For example, both the meat and bread groups provide substantial amounts of iron; however, a milligram of iron from the meat group costs more than a milligram of iron from the bread group.

The food groups in the thrifty plan, as well as in the other three plans revised in 1974, are shown below with the common foods included in each. Commercially processed foods and commercially prepared mixtures are included in the group containing the main ingredient (other than water).

Milk, cheese, ice cream: Milk--whole, low-fat, skim, buttermilk, flavored, dry, evaporated, condensed; cheese; ice cream; ice milk; yoghurt.

Meat, poultry, fish: Beef, veal, lamb, pork (includes bacon and salt pork); variety meats such as liver, heart, and tongue; luncheon meats; poultry; fish; shellfish.



Eggs.

Dry beans and peas, nuts: Dry beans of all kinds, dry peas, lentils, soybeans, peanuts, peanut butter, tree nuts.

Potatoes: White potatoes.

Citrus fruits, tomatoes: Grapefruit, lemons, limes, oranges, tangerines; tomatoes.

Dark-green and deep-yellow vegetables: Broccoli, chard, collards, kale, spinach, other dark greens; carrots, pumpkin, sweetpotatoes, yellow winter squash.

Other vegetables, fruit: All vegetables and fruit not included in other groups, such as asparagus, beets, brussels sprouts, cabbage, cauliflower, celery, corn, cucumbers, green lima beans, snapbeans, lettuce, okra, onions, parsnips, peas, peppers, rutabagas, sauerkraut, summer squash, turnips; apples, avocados, bananas, berries of all kinds, cherries, dates, figs, grapes, melons, peaches, pears, pineapple, plums, prunes, raisins, rhubarb.

Flour: Flour, meal, mixes for the preparation of bakery products.

Cereal: Cereals, including ready-to-eat cereals; rice, hominy, oats, noodles, macaroni, spaghetti, bulgur, buckwheat.

Bread: Commercially prepared bread, rolls (not sweet), biscuits.

Bakery products: Commercially prepared crackers, cookies, cakes, pies, doughnuts, sweet rolls; mixtures that are mostly grains.

Fats, oils: Butter, margarine, mayonnaise, salad dressing, salad and cooking oils, shortening.

Sugars, sweets: Sugar--granulated, powdered, brown, maple; molasses; sirup; honey; jams; jellies; preserves; powdered and prepared desserts; candy.

Accessories: Coffee, tea, cocoa. Punches, ades, nectars, soft drinks, carbonated and uncarbonated fruit drinks. Baking powder, yeast, vinegar, artificial sweeteners, salt, condiments.

### The Thrifty Plan and Food Consumption Patterns

Food consumption patterns 7/ for all sex-age categories provided the RDA 8/ for protein, vitamin A, thiamin, riboflavin, niacin, vitamin B<sub>12</sub>, and ascorbic acid. However, patterns for some categories were short in certain nutrients as follows:

<u>Nutrient</u>	<u>Sex-age category</u>
Calcium	Teenage girls; women; men, 55 years and older
Iron	Infants; children, 1- 2 years; teenage girls; women, 20-54 years
Vitamin B <sub>6</sub> <u>9/</u>	Teenage girls; women; men, 55 years and older
Magnesium <u>9/</u>	All 12 years and older

Fat in consumption patterns of older teenage boys, of men, and of women 20-54 years of age provided more than 40 percent of food energy--the upper limit for fat allowed in the plans. The number of eggs in the patterns for all persons over 9 years exceeded the limit of four per week set for the plans.

In developing the plan, adjustments to consumption patterns were required to meet nutritional goals. These adjustments involved the use of less meat, poultry, fish, and eggs and more dry beans and peas, nuts, and grain products. Amounts of selected food groups in the food consumption patterns, the thrifty plan, and the economy plan for a week for the average family of four in the Food Stamp Program are shown in Table 4.

In estimating the nutritive value and the cost of the plan, it is assumed that families following the plan select the kinds and amounts of foods in each of the food groups that the survey households selected on

7/ See page 14 for information on the derivation of food consumption patterns.

8/ RDA were increased by 5 percent in evaluating food patterns for the plan to allow for nutrient loss associated with the discard of a small amount of edible food discarded as plate waste or because of spoilage and the like.

9/ Evaluation based on rough estimate of content of food making up food consumption patterns. Content of this nutrient in many foods in the patterns is not known.

the average. The average amounts of the hundreds of foods selected by survey families are believed to provide the most reliable basis for food guides such as this plan to be used nationwide. However, such selections are not useful in interpreting the plan to families because they include all foods used by any of the survey households--many more foods than any single family uses. A list of commonly used foods for a family of four typical of those foods used in costing the plan is shown in Table 3. Sample menus for a month and lists of foods with amounts required to prepare them for a family of four following the plan are being developed and will be available from the Consumer and Food Economics Institute.

### The Thrifty Plan and the Economy Plan

The amounts of most food groups in the thrifty plan for the family of four are more like those in the average consumption pattern than are the amounts in the economy plan (Table 4). Compared to the economy plan, the thrifty plan contains slightly more meat, poultry, and fish and less eggs, dry beans, potatoes, dark-green and deep-yellow vegetables, and grain products.

### Nutritional Quality of the Thrifty Plan

The thrifty plan provides the nutritional goal of the RDA plus 5 percent for food energy, protein, calcium, iron, vitamin A value, thiamin, riboflavin, niacin, and ascorbic acid; and fat provides no more than 40 percent of the food energy. (See Table 5.) Nutritive values for average selections of foods within food groups <sup>10/</sup> were assumed in evaluating the plan.

The higher iron enrichment level for bread and flour proposed by the Food and Drug Administration in 1973 was assumed in the development of the plan. If that enrichment level is not adopted, the nutritional goal for iron will not be met by the plan for young children, teenage girls, and women of childbearing age, when average selections within food groups are made. However, the goal can be met through the frequent selection of foods providing important amounts of iron, such as liver, heart, kidney, lean meats, shellfish, dry beans, dry peas, dark-green vegetables, dried fruit, cereals with iron added, and molasses. Plans for all sex-age categories provide iron in excess of the amount specified by the NAS-NRC as likely to be furnished by a balanced and varied diet--6 mg or iron/1000 kcal--when current enrichment levels are assumed. Iron-fortified cereal is recommended for infants and children 1 to 2 years of age.

The vitamin B<sub>6</sub>, vitamin B<sub>12</sub>, and magnesium content of many foods in the plan is not known. Nevertheless, a rough estimate was made of levels provided by the plan. Foods in the thrifty plan (and the three more

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<sup>10/</sup> See page 15 for information on nutritive values of foods used.



expensive plans) furnish more than the RDA for vitamin B<sub>12</sub> but do not meet the RDA for vitamin B<sub>6</sub> and magnesium for several sex-age categories. Plans that meet the nutritional goals for vitamin B<sub>6</sub> and magnesium can be developed using the food composition data available, but such plans contain large amounts of vegetables, fruit, and cereal--two to three times as much as consumed by some sex-age categories in 1965-66. Such distortion of food consumption is not justified on this basis. Therefore, 80 percent of the RDA for vitamin B<sub>6</sub> and magnesium was used as the basis for goals in developing all of the USDA food plans.

Phosphorus levels of foods in the plans were not calculated but are believed to be well above the RDA. Iodization of salt is the most efficient way to supplement dietary iodine. It is recommended, therefore, that iodized salt be used in households.

The requirement for vitamin D for normal persons can be met by exposure to sunlight. However, for infants and elderly persons whose activities limit their exposure to sunlight, the allowance should be provided in the diet by such foods as eggs, liver, butter, and milk fortified with vitamin D or by supplementation.

Insufficient reliable information is available on the content in foods of the three other nutrients for which RDA are set--vitamin E, folacin, and zinc--to make reliable estimates of levels provided by the plans.

Food plans developed to meet the RDA would be expected to provide generous amounts of nutrients for most persons. The NAS-NRC states that the basis for the RDA is such that "even if a person habitually consumes less than the recommended amounts of some nutrients, his diet is not necessarily inadequate for those nutrients." (See footnote 4/.)

Allowances are not specified by the NAS-NRC for some dietary factors of adequate diets. An example is linoleic acid, an essential fatty acid found in large concentrations in many oils that come from plants. Notable exceptions are olive oil and coconut oil. Margarines, salad dressings, mayonnaise and cooking oils are usually made from one or more vegetable oils. Also, dietary fiber is necessary for the normal functioning of the intestinal tract. Good sources of fiber include whole-grain cereals, fruits, vegetables, and legumes, such as dried peas and beans.

#### Other Economical Food Plans

In developing and estimating costs for the thrifty plan, the basic assumption is made that families might be encouraged by nutrition educators to change the amounts of food groups they use to achieve a

nutritious diet. But they might not have either the skill or the opportunity to consistently select foods within food groups that are more economical than those made on the average by survey households with relatively low food costs.

The thrifty plan is only one of many combinations of food groups that could be developed at extremely low cost. Amounts of food groups in consumption patterns could be changed in other ways to provide nutritious diets. While such combinations would deviate further than the thrifty plan from food consumption patterns, they might be acceptable to some households.

Other plans at the same or lower cost than the thrifty plan could be developed if selections of foods within food groups were limited to only those foods which are the least expensive, rather than selections typical of those of survey households. For example, the thrifty plan contains some fluid milk, as was typical of the consumption of the survey households. Nonfat dry milk costs only about half as much as fluid milk, yet provides as much or more of most nutrients supplied by fluid milk. Therefore, a plan that assumes the use of nonfat dry milk exclusively might be developed at a cost lower than the cost of the thrifty plan. Or a plan at the same cost as the thrifty plan might be developed with only nonfat dry milk and more meat, poultry, and fish and less dry beans and grain products than the thrifty plan.

Through guidance materials and nutrition education programs, families using food stamps and other families wishing to economize on food are encouraged to, and may alter their consumption to, include only the economical foods within the food groups. 11/ However, for purposes of estimating the nutritive value and the cost of a plan for use nationwide, average selections of foods based on those made by survey families with relatively low food costs are believed to be more reasonable.

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11/ One USDA publication that provides information on food shopping for consumers interested in economizing on food is "Your Money's Worth in Foods," USDA, HG-183. Single copies are available free from the Office of Communication, U.S. Department of Agriculture, Washington, D.C. 20250.

## II. Development of the Thrifty Food Plan

### Procedures in Brief

Procedures used in developing the thrifty food plan are summarized below:

1. Selected households surveyed in 1965-66 that could be used to show food consumption patterns of households that use food at relatively low cost.
2. Estimated the average nutritive value per pound of each of 17 selected groups of foods 12/ used by survey households.
3. Updated prices paid by survey households in 1965-66 to 1974 levels using change in retail prices of foods in U.S. cities collected by the Bureau of Labor Statistics. Computed average price per pound of food in each food group.
4. Estimated the amount of food groups used (as purchased basis) to prepare meals and snacks for a week for individuals in 12 sex-age categories and for pregnant and nursing women, using survey data on household use of food and the food intake of individuals.
5. Computed the food energy provided by food used for each sex-age category and related it to the appropriate RDA. Then for each category, adjusted amounts of food groups proportionately as necessary to provide 105 percent of the recommended allowance for food energy. These adjusted quantities are the food consumption patterns used in food plan development.
6. Defined upper and lower limits on amounts of each food group to be allowed in the plan. Defined any relationships among food groups required for the preparation of foods into meals.
7. Defined the nutritional goals for the plan based on the RDA plus 5 percent. By increasing the RDA by 5 percent, sufficient food is included in a plan meeting the goal to allow for a small discard of edible food as plate waste, etc.
8. Determined a cost for the plan for each sex-age category to assure that the general cost level was suitable for groups of households on limited food budgets and there was an equitable distribution of money for food among sex-age categories.

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12/ Accessories, the 15th group shown in Table 1, was considered as three separate groups--coffee, tea, and cocoa; soft drinks, punches, and ades; and leavenings and seasonings--in



9. Used a mathematical model designed for food plan development to determine the optimum plan (combination 17 groups of foods) for each sex-age category. The optimum plan provided nutritional goals within cost and quantity limits with a minimum of deviation from the food consumption pattern (5 above).
10. Prepared a typical list of foods for a family based on (1) total amounts of 17 groups of foods in the plans for the sex-age categories of family members and (2) the distribution of foods used in largest amounts within groups by selected survey households (1 above).

#### Model

A quadratic programming model was used in development of the 1974-75 food plans. 13/ It selected the optimum plan for each sex-age category--the amounts of 17 food groups that represented as little change from the amounts of the food groups used (food consumption pattern) as was necessary to meet specifications. Specifications were set for the nutrient content and cost of the total plan and for quantities for each of the food groups.

"Change" was measured in terms of squared weighted deviations from the amount of food groups in the consumption pattern, and total change was minimized. The weights were set to cause deviations to be minimized on the basis of the percentage change rather than change in pounds of food groups. The squaring of weighted deviations resulted in small changes in amounts of several food groups, rather than a large change in one group to meet a specification.

A published computer program 14/ was adapted in conjunction with the development of the model. Food economists, nutritionists, and mathematicians selected and prepared input data, defined the specifications, derived the equations, adapted the computer program, and evaluated the results of each trial run.

#### Data Used

Data required were as follows:

1. Food consumption patterns--amounts (pounds) of 17 food groups used in preparing food for a week for each of 12 sex-age categories and for pregnant and nursing women (categories).

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13/ Model developed by Joseph L. Balintfy, University of Massachusetts, in consultation with Bruce Gray, Judy P. Chassy, and Betty Peterkin, Consumer and Food Economics Institute, Agricultural Research Service.

14/ Ravindran, Arunachalam, "A Computer Routine for Quadratic and Linear Programming Problems." Communications of the Association for Computing Machinery, Inc., 15(9): 818, September 1972.

2. Nutritive value of food groups--amounts of food energy and nutrients provided on an average by a pound of each of the 17 food groups.
3. Price per pound of each of 17 food groups.
4. Nutritional goals--total amounts of food energy and 12 nutrients to be provided by the plan for each of the categories.
5. Maximum cost of the plan for each of the categories.
6. Limits on quantities of food groups in plan for each of the categories.

Food consumption patterns.--The 1965-66 Household Food Consumption Survey data were used to estimate quantities of 17 food groups for the preparation of meals and snacks for persons in the sex-age categories. Urban households used for estimating these quantities for the plan were selected by the money value of food they used per person in a week.

Households were first put in order by the money value of food they used (food costs) per person. Households from the 10th to the 25th percentile, with food costs from \$5.00 to \$6.99 per person per week in 1965-66, were used as the basis for food consumption patterns for the thrifty plan. In comparison, those from the 26th to the 49th percentile, \$7.00 to \$8.99 food costs, were used as the basis for patterns for the low-cost plan; those from the 50th to the 76th percentile, \$9.00 to \$11.99 food costs, for the moderate-cost plan; and those from the 77th to the 92nd percentile, \$12.00 to \$15.99 food costs, for the liberal plan. Households with extremely low and high food costs were excluded. Detailed information on food consumption of these groups of households is presented in Household Food Consumption Survey 1965-66, Report No. 17. (See footnote 6/.)

The households selected as a basis for consumption patterns for the thrifty plan used food valued at or slightly above the cost of the economy food plan--the cost level that was accepted by Congress for setting the Food Stamp allotment. Food patterns of such households represent a slightly more costly way of eating than persons using the economy plan could afford, a way of eating that they might select if they had a little more money to spend for food. The median income of the households with money value of food of \$5.00-\$6.99 was \$5,190 in 1964; and about 80 percent of them reported incomes above the poverty threshold. Two-thirds of the households had diets that were rated good or fair--provided two-thirds or more of the amounts of seven nutrients recommended at the time of the survey; more than one-fifth of the households had diets that were rated good--provided recommended amounts of nutrients.

The share of food used by the survey households that was prepared for each family member is not known. But amounts were estimated by using information on the average amount of food eaten (intake) by individuals classified by sex and age. (See footnote 5/.) To do this, average intakes of foods from the food groups for persons in the sex-age categories were first weighted by the sex-age composition of the selected households to estimate the average intake per person in the households. Then the ratios of the intakes for the various sex-age categories to the estimated average intake per person in the selected households were applied to the average amount of the food group used (in terms of weight as purchased) per person by the selected households to estimate the amount of the food used for various sex-age categories.

Amounts of the 17 food groups for each sex-age category were then increased or decreased proportionately to provide the nutritional goal for food energy--RDA plus a 5 percent allowance for food discard. (See page 16.) Total food energy for a sex-age category may have differed from the goal for several reasons. For example, more or less food may have been eaten than was required to provide the RDA; or the discard of edible food due to plate waste, spoilage, and the like in the household may have been more or less than the amount allowed for in the plan. In adjusting amounts of food groups to provide the food energy goal, it was assumed that all food groups were equally affected by such differences. The adjusted amounts of food groups for a sex-age category make up the food consumption pattern for the category used in the model as a basis for developing the plan to meet nutritional goals for nutrients.

Nutritive value of food groups.--Average nutritive values per pound of 17 food groups used by selected survey households were used in the model to estimate the nutritive value of various combinations of food groups. Values were estimated for food energy, protein, fat, total saturated fatty acids, linoleic acid, oleic acid, carbohydrate, calcium, iron, magnesium, vitamin A value, ascorbic acid, niacin, riboflavin, thiamin, vitamin B<sub>6</sub>, and vitamin B<sub>12</sub>. For fatty acids, magnesium, vitamin B<sub>6</sub>, and vitamin B<sub>12</sub>, estimates were based on values for only a limited number of foods in the food groups.

Nutritive values for the edible portion of food per pound of food as purchased, from "Composition of Foods...raw, processed, prepared," USDA, AH No. 8; "Pantothenic Acid, Vitamin B<sub>6</sub>, and Vitamin B<sub>12</sub> in Foods," USDA, HERR 36; and unpublished data, were the basis for the estimates. Values were adjusted, when necessary, for vitamin losses during cooking. For meat, discard of drippings and one-half of the separable fat were assumed. For bread and flour, enrichment levels for thiamin, riboflavin, and niacin that became effective July 1975 were assumed; and for iron, the levels proposed in 1973 were assumed.



Prices of food groups.--Prices of food paid in 1965-66 by survey households selected for food consumption patterns (page 14) were updated to 1974 levels using procedures for estimating costs described on page 20.

Nutritional goals.--The 1974 RDA provided the basis for the lower limit for food energy and nutrients in the plans: RDA for food energy, protein, calcium, iron, vitamin A value, thiamin, riboflavin, niacin, vitamin B<sub>12</sub> and ascorbic acid; and 80 percent of the RDA for magnesium and vitamin B<sub>6</sub> for all sex-age categories. (See page 9.)

The lower limits for nutrients include an allowance of 5 percent above the RDA (and above 80 percent of the RDA for magnesium and vitamin B<sub>6</sub>) to allow for some discard of edible food without jeopardizing the nutritional quality of the diet. Such allowance is believed necessary because some edible food is discarded in most homes in the preparation of food, as plate waste or due to spoilage. (The discard of inedible parts of food, such as peelings, bone, and excessive fat, and the losses of vitamins in cooking, is allowed for in the nutritive values used in evaluating the plans.)

Upper limits for food energy of 10 percent above the RDA were used in development of the plan. Upper levels were not set for nutrients except fat, which was limited so that it provided no more than 40 percent of the food energy. This level of fat is lower than found in average U.S. diets in 1965-66, but higher than the level (35 percent) recommended by the American Heart Association (AHA). In the 1974 edition of the Recommended Dietary Allowances the AHA recommendation is mentioned, but a maximum level of fat in diets for the general population is not specified by NAS-NRC. (See footnote 4/.) No limit on cholesterol in the plans was imposed. However, eggs--a food containing considerable cholesterol--were limited to four per person per week. See "Fats in Food and Diet," Agricultural Information Bulletin 361, for information about the effects of dietary fat on health.

Maximum cost.--A maximum cost for each sex-age category was predetermined to help assure that (1) there would be an equitable distribution of money for food among sex-age categories and (2) the per capita cost of the new plan would equal that of the economy plan. 15/

To determine equitable costs for the sex-age categories, differences among categories both in the basic cost of providing the nutritional goals and in the cost of existing food consumption patterns were considered.

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15/ Ten percent of the U.S. households surveyed in 1955 used food with a money value per person per week below the cost of the economy plan at that time. Similarly ten percent of the households surveyed in 1965-66 used food with a money value below the cost of the economy plan.

Such differences were approximated from the costs of two preplans-- combinations of food groups in the pattern changed as little as was required to meet the nutritional goals, one at least cost and the other with no limit on cost. Certain limits on quantities of food groups were imposed, as described in the paragraph below. These preplans and their costs were determined for each sex-age category by using the quadratic programming model. Equitable costs were determined for the categories by subtracting a constant proportion of the difference between costs for the two preplans from the cost of the more expensive preplan. The proportion used was set to result in the per capita cost of the economy plan.

Limits on quantities of food groups.--Upper limits of twice the amount of food groups in the food consumption pattern and lower limits of one-half the amount were imposed. Exceptions were the fat and sugar groups, for which no more than the amount in the pattern was allowed, and the soft drinks group, for which about half the amount in the pattern was allowed. Few of these limits on quantities of food groups were binding in the development of the plan.

Upper and lower limits on the ratio of the amount of flour to the amount of leavening agents and seasonings were imposed. Certain other limits on quantities of food groups were investigated but not used in developing this food plan.

#### Assumptions Summarized

Several assumptions are basic to the model and the data used in developing the thrifty food plan.

1. Average amounts of groups of foods consumed by households between the 10th and the 25th percentile on a distribution of urban households (1965-66) by the money value of food used per person provide a diet that is palatable to households.
2. A diet that conforms to an average food consumption pattern is palatable; the greater the change from the pattern the less palatable the diet becomes.
3. Equal percentage changes in the amount of various food groups consumed will have equal adverse effect on palatability of the diet.
4. Small change in the average consumption of several groups of foods is preferable to a large change in the average consumption of one group of foods.

5. A person generally will not eat more than twice as much or less than half as much of any food group as is consumed on the average by persons of his sex and age.
6. Average prices paid by households between the 10th and 25th percentile on a distribution of urban households (1965-66) by the money value of food used per person were representative of those paid by households that might have used the thrifty plan at the time of the survey. Such prices reflect the assortment of container sizes and brands, the differences in quality of food selected and the price levels of the stores of purchase used by households following the thrifty plan.
7. The percentage change in a price paid for a food by survey households since the time of the survey can be approximated by the percentage change in the price collected by the Bureau of Labor Statistics for that food or a similar food.
8. An equitable distribution of money for food for household members allows for differences in their nutritional need and in food consumption patterns.
9. A "nutritionally adequate" diet is one that is made up of a variety of foods that provides the RDA for nutrients for which adequate reliable food composition data are available for determining the content of the diet.
10. The nutritive value per unit of the food group based on average selections of foods within the group made by survey households (1 above) best represents the nutritive value of selections made by users of the thrifty food plan.
11. Households following the plan select a variety of foods within each food group to provide the average nutritive value per unit of food group (10 above).
12. The foods in a food group are sufficiently similar in nutritive value to allow one food within a food group to be replaced by an equal amount of another food in the group without seriously jeopardizing the nutritional contribution of the group of foods in the plan.
13. The variety of foods within groups is sufficient to allow most families to select foods that they enjoy eating and can buy at reasonable prices in stores where they shop or can obtain from other sources.



13. Amounts of foods to buy and to serve can be described more easily in terms of 15 food groups than in terms of thousands of individual foods actually used by survey families.
14. Some discard of edible food will occur in all households as plate waste, because of spoilage, and the like.
15. Discard of edible food will occur for a food in proportion to the amount of that food in the plan. Five percent above the amount of edible food to be consumed is allowed for discard.

### III. Estimated Costs for the Thrifty Plan .

U.S. average costs of foods in the thrifty plan are estimated each month (See Table 2.) and released to agencies that use the costs as economic standards. The costs are also released periodically in publications prepared by ARS for leaders and consumers.

#### How Costs Are Estimated

Average prices paid for almost 2,000 different foods by households across the country with relatively low food costs surveyed in 1965-66 (See page 14.) are used as a basis for the estimates. These average prices reflect the assortment of container sizes and brands, the differences in quality of food selected, and the price level of the store of purchase for families who use food at relatively low cost. Procedures used in updating costs of the plans with these prices are as follows:

1. Prices paid by survey households are updated by using the percentage change in prices of a list of 93 carefully defined foods from the time of the survey to the month of the estimate. Prices for these foods are collected each month by the Bureau of Labor Statistics (BLS) from a representative sample of stores in selected cities across the country.

For example: Survey households used as a basis for the thrifty plan paid an average price of 60 cents a pound for ground beef in 1965-66; and the price for ground beef collected by BLS in August 1975 is 50 percent higher than the price collected by BLS in 1965-66. A price of 90 cents ( $60\text{¢} + 50\% \text{ of } 60\text{¢}$ ) is used for ground beef in figuring the cost of the thrifty plan in August. Prices of certain other low-cost cuts of beef that were used by survey families, but are not priced regularly by BLS, are increased by 50 percent also. The percentage increases in the BLS price for other beef cuts are used to update prices paid by survey households for the numerous remaining cuts of beef they used.

2. The updated prices for foods in each food group for the thrifty plan are weighted by the average amounts of foods used by the survey households to derive a price per unit--pound, quart, or dozen.
3. The prices per unit are then multiplied by the number of units of food groups in the plan for each sex-age category (Table 1) to determine the cost of foods from each food group.

4. Costs for the food groups for each category are totaled. These totals, rounded to the nearest 10 cents, are released as the cost of food at home for a week. Unrounded weekly costs are multiplied by 4.333, then rounded to the nearest 10 cents, to estimate the cost for the month.

The August 1975 costs for the thrifty plan are shown in Table 2.

#### The Cost of the Plan for a Family

The cost for food at home for a family following the thrifty plan can be figured using Table 2 as follows:

1. Find the weekly cost for each person eating from family food supplies. List the amount opposite the age and sex of each person as follows:
  - o For family members who eat all meals at home (or carry meals from home, such as lunches or picnics), use the weekly cost given in Table 2.
  - o For family members who eat some meals out, deduct 5 percent for each meal not eaten at home from the cost in the table. For example, if a child eats lunch out five times a week, subtract 25 percent, or one-fourth, of the cost shown for the child's age group.
  - o For guests and others who occasionally eat with the family, list 5 percent of the cost in the table for the proper age group for each meal. Suppose grandmother eats her midday and evening meals with the family every Sunday. Add 10 percent, or one-tenth, of the amount for women of her age.
2. Next, total the costs listed and adjust the total if there are more or fewer than four persons usually eating at the family table. Costs in Table 2 are for individuals in families of four persons. Adjustment 16/ is necessary because large families tend to buy and use foods more economically than small families. If the family has--

1 person.....	add 20 percent
2 persons.....	add 10 percent
3 persons.....	add 5 percent
4 persons.....	use as is
5 and 6 persons.....	subtract 5 percent
7 or more persons.....	subtract 10 percent

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16/ Information on the derivation of the adjustment factors is available upon request from the Consumer and Food Economics Institute.



Table 1.--Thrifty Food Plan

Amounts of Food for a Week  $\frac{1}{2}$ 

Family member	Milk, cheese, ice cream $\frac{2}{3}$	Meat, poultry, fish $\frac{3}{4}$	Eggs No	Dry beans and peas, nuts $\frac{1}{2}$	Dark-green, deep-yellow vegetables $\frac{1}{2}$	Citrus fruit, tomatoes	Potatoes vegetables, fruit	Cereal	Flour	Bread	Other bakery products		Fats, Sugar, oils sweets		Accessories	
											Lb	Lb	Lb	Lb		Lb
Child:																
7 months to 1 year	4.95	.39	1.2	.15	.41	.55	.09	1.02 $\frac{6}{8}$	.02	.08	.04	.04	.19	.05		
1-2 years	3.30	.83	3.3	.17	.22	.89	.65	1.02 $\frac{5}{8}$	.31	.78	.24	.11	.30	.37		
3-5 years	3.54	.95	2.5	.28	.20	.92	.88	1.03	.37	.94	.53	.38	.74	.59		
6-8 years	4.22	1.27	2.4	.49	.22	1.10	1.23	1.12	.62	1.42	.79	.51	.94	.84		
9-11 years	4.92	1.61	3.4	.53	.28	1.52	1.48	1.34	.81	1.82	1.10	.60	1.20	1.10		
Male:																
12-14 years	5.18	1.79	3.6	.67	.33	1.45	1.59	1.22	.81	2.07	1.13	.77	1.21	1.45		
15-19 years	5.08	2.35	4.0	.43	.32	1.70	2.10	.98	.99	2.36	1.46	1.00	1.05	1.73		
20-54 years	2.57	3.03	4.0	.44	.39	1.80	2.02	.89	.92	2.29	1.33	.95	.86	1.24		
55 years and over	2.37	2.45	4.0	.25	.51	1.85	1.75	1.09	.80	1.90	1.12	.79	.94	.73		
Female:																
12-19 years	5.35	1.80	3.8	.28	.42	1.74	1.22	.72	.76	1.49	.84	.51	.74	1.36		
20-54 years	2.81	2.41	4.0	.27	.52	1.86	1.51	.90	.67	1.41	.67	.57	.57	1.18		
55 years and over	2.85	1.84	4.0	.19	.60	2.02	1.26	1.12	.68	1.30	.58	.37	.45	.66		
Pregnant	5.25 $\frac{1}{2}$	2.69	4.0	.42	.56	2.17	1.89	1.13	.58	1.41	.66	.59	.58	1.48		
Nursing	5.25 $\frac{1}{2}$	3.00	4.0	.38	.57	2.36	1.92	.98	.63	1.56	.82	.80	.75	1.54		

 $\frac{1}{2}$  Amounts are for food as purchased or brought into the kitchen from garden or farm to prepare all meals and snacks for the week.

Amounts allow for a discard of about 5 percent of the edible food as plate waste, spoilage, etc.

 $\frac{2}{2}$  Fluid milk and beverage made from dry or evaporated milk. Cheese and ice cream may replace some milk. Count as equivalent to a quart of fluid milk: Natural or processed Cheddar-type cheese, 6 oz.; cottage cheese, 2-1/2 lbs.; ice cream or ice milk, 1-1/2 quarts; unflavored yogurt, 4 cups. $\frac{3}{3}$  Bacon and salt pork should not exceed 1/3 pound for each 5 pounds of this group. $\frac{4}{4}$  Weight in terms of dry beans and peas, shelled nuts, and peanut butter. Count 1 pound of canned dry beans--pork and beans, kidney beans, etc.--as .33 pound. $\frac{5}{5}$  Includes coffee, tea, cocoa, soft drinks, punches, ades, leavenings, and seasonings. $\frac{6}{6}$  Cereal fortified with iron is recommended. $\frac{7}{7}$  For pregnant and nursing teenagers, 7 quarts is recommended.

Table 2.--Cost of Food at Home Estimated for the Thrifty Food Plan 1/  
August 1975, U.S. Average

Sex-age groups	Cost for--	
	1 Week	1 Month
	<u>Dollars</u>	<u>Dollars</u>
<u>FAMILIES</u>		
Family of 2: <u>2/</u>		
20-54 years .....	22.70	98.00
55 years and over .....	20.20	87.50
Family of 4:		
Couple, 20-54 years and--		
-Children, 1-2 and 3-5 years .....	31.90	138.40
-Children, 6-8 and 9-11 years .....	38.60	166.90
Household receiving food stamps <u>3/</u> .....	35.70	154.50
<u>INDIVIDUALS</u> <u>4/</u>		
Child:		
7 months to 1 year .....	4.40	19.30
1-2 years .....	5.10	22.30
3-5 years .....	6.20	27.00
6-8 years .....	8.00	34.50
9-11 years .....	10.00	43.30
Male:		
12-14 years .....	10.70	46.30
15-19 years .....	11.80	51.10
20-54 years .....	11.40	49.20
55 years and over .....	10.10	43.60
Female:		
12-19 years .....	9.50	41.20
20-54 years .....	9.20	39.90
55 years and over .....	8.30	35.90
Pregnant .....	11.40	49.30
Nursing .....	12.10	52.60

- 1/ The cost of the food plan was first estimated by using the average price per pound of each food group paid by urban survey families with relatively low food costs in 1965-66. These prices were adjusted to current levels by use of "Estimated Retail Food Prices by Cities" released periodically by the Bureau of Labor Statistics.
- 2/ Ten percent added for family size adjustment. See footnote 4.
- 3/ Costs are for average sex-age composition of survey households of four persons, National Survey of Food Stamp and Food Distribution Recipients, November 1973.
- 4/ The costs given are for individuals in 4-person families. For individuals in other size families, the following adjustments are suggested: 1-person--add 20 percent; 2-person--add 10 percent; 3-person--add 5 percent; 5-or-6-person--subtract 5 percent; 7-or-more-person--subtract 10 percent.

Table 3.--Food List for a Month Based on the Thrifty Food Plan  
Average 4-Person Household Receiving Food Stamps

Milk (includes nonfat dry milk)	5 $\frac{1}{4}$ qt	Fruit, canned.....	5-1/2 lb
Cheese.....	4-3/4 lb	Fruit juice, canned.....	2-1/2 lb
Ice cream.....	6 qt	Lettuce, salad greens.....	4 lb
Beef.....	13 lb	Cabbage.....	2-1/2 lb
Pork.....	6-1/2 lb	Other fresh vegetables.....	7-1/2 lb
Variety meat.....	3-1/2 lb	Snapbeans, canned.....	2 lb
Poultry.....	7 lb	Green peas, canned.....	2 lb
Fish.....	2 lb	Other canned and frozen vegetables, vegetable soup...	7 lb
Eggs.....	5 doz	Flour and mixes.....	12 lb
Dry beans.....	2-1/2 lb	Cornmeal.....	3 lb
Mature beans, canned.....	4 lb	Rice or pasta.....	6 lb
Peanut butter.....	2-1/2 lb	Ready-to-eat cereal, other cereal.....	8 lb
Carrots.....	3 lb	Bread.....	26 lb
Dark-green leafy vegetables....	2 lb	Crackers.....	2-1/2 lb
Other dark-green and deep-yellow vegetables.....	1-1/2 lb	Other bakery products; soups, mainly rice or pasta..	11-1/2 lb
Citrus fruit or juice.....	17 lb	Margarine, butter.....	5 lb
Tomatoes, tomato products.....	9 lb	Shortening, oil or salad dressing.....	5 lb
Potatoes.....	24 lb	Sugar.....	8 lb
Apples.....	8-1/2 lb	Other sweets.....	5-1/2 lb
Bananas.....	5 lb		
Other fresh fruit.....	8-1/2 lb		

Note: Provides for the average food needs (as suggested in the thrifty food plan for men, women, and children of different ages) of 4-person households receiving food stamps, National Survey of Food Stamp and Food Distribution Program Recipients, November 1973. In addition to foods listed, most families use some other foods: coffee, tea, cocoa, soft drinks, punches, ades, leavening agents, and seasonings. Approximately 5 percent above the cost of the foods on the list is allowed for purchase of these foods when costs for the plan are estimated.



Table 4.--Food Consumption Pattern, Thrifty Food Plan, and Economy Food Plan  
Average 4-Person Household Receiving Food Stamps 1/

Food group	Quantity per household per week		
	Food consumption pattern <u>2/</u>	Thrifty food plan	Economy food plan
Milk, cheese, ice cream <u>3/</u> .....quart	14.1	15.2	16.0
Meat, poultry, fish.....pound	12.9	7.4	7.0
Eggs.....dozen	1.6	1.1	1.7
Dry beans and peas, nuts <u>4/</u> .....pound	1.0	1.4	1.8
Potatoes.....pound	5.2	5.5	10.4
Dark-green, deep-yellow vegetables....pound	1.5	1.5	3.4
Citrus fruit, tomatoes.....pound	6.8	6.0	6.1
Other vegetables, fruit.....pound	14.2	12.6	11.8
Grain products <u>5/</u> .....pound	8.5	11.4	11.8
Fats, oils.....pound	2.4	2.3	2.2
Sugar, sweets.....pound	3.4	3.1	2.4

1/ Sex-age composition of household based on National Survey of Food Stamp and Food Distribution Program Recipients, November 1973.

2/ Based on food consumption of urban survey households that used food valued at or slightly above the cost of the economy plan, 1965-66.

3/ Fluid milk, or its calcium equivalent in evaporated milk, dry milk, cheese, and ice cream.

4/ Weight in terms of dry beans and peas, shelled nuts, and peanut butter.

5/ Weight in terms of flour and cereal

Table 5.--Nutritive Value for Thrifty Food Plan 1/  
as Percentage of the Nutritional Goals 2/

	Child				Male				Female		
	Under 1 year	1-2 years	3-5 years	6-8 years	9-11 years	12-14 years	15-19 years	20-54 years	55 years or more	20-54 years	55 years or more
Food energy	100	100	100	100	100	100	100	100	100	100	100
Protein	223	204	182	200	208	198	170	150	130	147	135
Calcium	166	100	100	125	126	106	106	110	100	100	100
Iron	100+ <u>3/</u>	100+ <u>3/</u>	115	185	179	135	152	257	233	109	192
Vitamin A value	173	140	134	120	117	100	109	108	110	132	134
Ascorbic acid	100	100	105	126	157	149	167	164	163	160	167
Niacin <u>1/</u>	194	218	204	210	213	215	204	224	221	227	249
Riboflavin	271	219	166	171	192	172	147	133	133	164	171
Thiamin	157	175	146	137	144	139	134	135	146	138	151
Vitamin B <sub>6</sub>	330	285	195	172	165	148	118	115	110	100	100
Vitamin B <sub>12</sub>	100+ <u>4/</u>	100+ <u>4/</u>	286	244	223	184	193	172	159	170	148
Magnesium	313	174	146	148	143	126	111	114	103	118	108

1/ Nutritive value of the edible portion of food as purchased, adjusted to allow for vitamin losses in cooking. Discard of meat drippings and one-half of the separable fat from meat is assumed. For bread and flour, enrichment levels for iron proposed in 1973 are assumed. Values for niacin for all foods include niacin in the food and an estimate of the niacin formed in the body from the protein substance, tryptophan. Values for vitamin B<sub>6</sub>, vitamin B<sub>12</sub>, and magnesium are estimated for many foods in the plans because of insufficient information on content of foods.

2/ Nutritional goals are based on the Recommended Dietary Allowances, 1974, for all nutrients except vitamin B<sub>6</sub> and magnesium, for which 80 percent of the RDA is used. The goals, the RDA base plus 5 percent, allows for some discard of edible food. Therefore, the amounts of foods in the plan provide 5 percent more than the percentage shown, if no edible food is discarded. A range of 105 to 110 percent of the RDA for food energy is allowed. Fat is limited to provide no more than 40 percent of food energy.

3/ Assumes that cereal fortified with iron is used. Percentage varies depending on the level of fortification of cereals used.

4/ Percentage varies depending on level of fortification of cereals used.







